MS-DOS

Microsoft Disk Operating System
for
8086/8088 Microcomputers

Provides:

- Microsoft language support
- Easy conversion from 8080 to 8086
- Device independent I/O
- Advanced error recovery procedures
- Full program relocatability
- Powerful, flexible file characteristics
- 100% compatibility with IBM Personal Computer

MS-DOS

Standard Operating System for 8086 Micros

MS-DOS is a disk operating system from Microsoft for 8086/8088 microprocessors. International Business Machines Corp. chose MS-DOS (called IBM Personal Computer DOS) to be its operating system of choice for its Personal Computer. Microsoft's agreements with IBM and several other major computer manufacturers indicate that end-user systems running MS-DOS will be widely available in the near future, making MS-DOS the standard low-end operating system for 8086 micros. Why is MS-DOS becoming popular? MS-DOS is an important advance in microcomputer operating systems.

What Makes MS-DOS Important?

All of Microsoft's languages (BASIC Interpreter, BASIC Compiler, FORTRAN, COBOL, Pascal) are available immediately under MS-DOS. Users of MS-DOS are assured that their operating system will be the first that Microsoft will support when any new products or major releases are announced. In addition, the 8-bit versions of Microsoft's languages are upward compatible with the 16-bit versions. Thus, application programs written in 8-bit Microsoft languages can be run under MS-DOS with little or no modification. Microsoft wants to encourage both the transporting of 8-bit to 16-bit software, and the development of new 16-bit software.

Here are the major features that make MS-DOS the operating system people want to use on 8086 machines:

- **Easy Conversion from 8080 to 8086**

  MS-DOS allows as much transportability of 8-bit machine language software as is possible. MS-DOS emulates system calls to CP/M-80. By simply running assembly language source code through the Intel conversion program, almost all 8080 programs will work without modification. In most cases, a conversion to MS-DOS is easier than conversion to other operating systems.

- **Device Independent I/O**

  MS-DOS simplifies I/O to different devices on the UNIX concept. A single set of I/O calls treats all devices alike from the user's perspective. There is no need to rewrite programs when a new device is added to the system. Simply OPEN the device and READ or WRITE. Also, device independent I/O assures that different control characters (specifically TAB) are handled the same by the different devices.

- **Advanced Error Recovery Procedures**

  MS-DOS doesn't simply fade away when errors occur. If a disk error occurs at any time during any program, MS-DOS will retry the operation three times. If the operation cannot be completed successfully, MS-DOS will return an error message, then wait for the user to enter a response. The user can attempt recovery rather than reboot the operating system.

- **Complete Program Relocatability**

  MS-DOS is a truly relocatable operating system. Not only can the Microsoft relocatable linking loader provide for separate segments, but also the COMMAND program in MS-DOS relocates the modules during loading rather than loading them to preset addresses. Thus, MS-DOS does not have the 64K program space limitation of other operating systems.

- **Powerful, Flexible File Characteristics**

  MS-DOS has no practical limit on file or disk size. MS-DOS uses 4-byte XENIX OS compatible logical pointers for file and disk capacity up to 4 gigabytes.

  Within a single diskette, the user of MS-DOS can have files of different logical record lengths. MS-DOS is designed to block and deblock its own physical sectors; 128 is not a sacred number in MS-DOS.

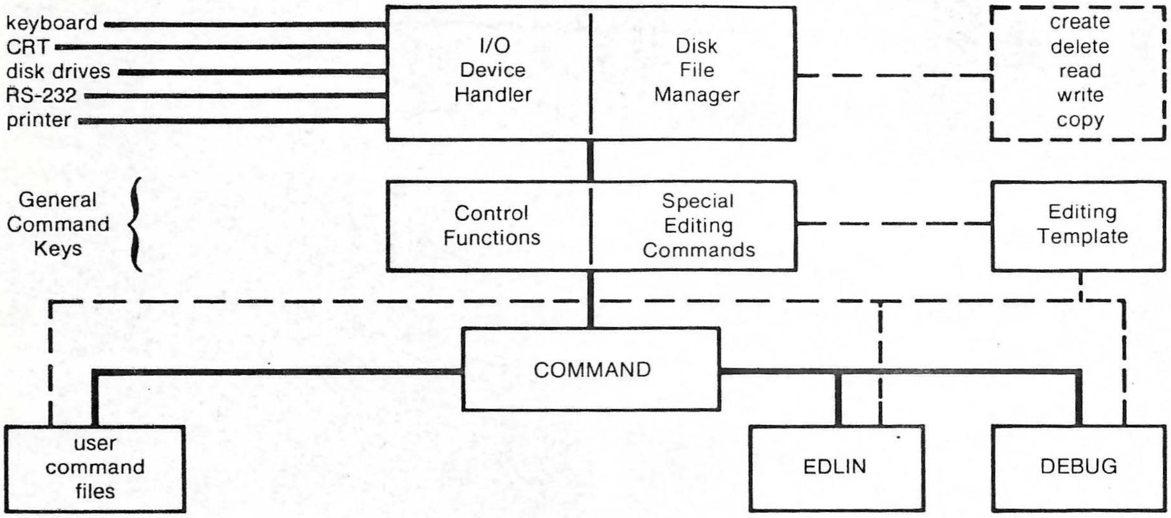
  MS-DOS remembers the exact end of file marker. Thus, should one open a file with a logical record length other than the physical record length, MS-DOS remembers exactly where the file ends to the byte, rather than rounded to 128 bytes. This alleviates the need for forcing Control-Z's or the like at the end of a file.

The Future of MS-DOS

Microsoft plans to enhance MS-DOS. The additional addressing space of the 8086 processor makes multi-tasking a particularly attractive enhancement. An upward migration path to the XENIX operating system through XENIX compatible system calls, "pipes," and "forking" is another planned enhancement.

Plans for MS-DOS also include disk buffering, graphics and cursor positioning, kanji support, multi-user and hard disk support, and networking.

MS-DOS Structure and Characteristics



The MS-DOS operating system consists of a disk file manager and an I/O device handler. The disk file manager supports commands that allow the user to perform all the basic file tasks — create, delete, read, write, copy. The I/O device handler manages the keyboard, CRT, disk drives, RS-232, and printer.

A set of Control function characters and Special Editing commands can be used in all standard MS-DOS programs (EDLIN, COMMAND, DEBUG), and in any other program run under MS-DOS to edit commands to these programs. The actual keys for these characters and commands may be changed to make the best use of a specific terminal keyboard.

MS-DOS operates through a "template" in the input buffer. The template is simply the last input line entered and is used for editing purposes. The advantage of this template method is that a new line can be edited right away, a command can be repeated if necessary, and a command can be edited before retrying it in case an erroneous command was entered.

COMMAND

COMMAND is the interface program between the user and the file manager. COMMAND converts user input to system calls. COMMAND allows the user to perform some file management function and to load and execute a program. Therefore, any executable file is considered a valid external command.

EDLIN

EDLIN is a line text editor. Each line may be up to 255 characters.

Line numbers are dynamic. When lines are inserted or deleted, all line numbers following the change are incremented automatically.

If the file specified during EDLIN invocation exists, EDLIN loads the file into memory. If the file specified does not exist, EDLIN creates the file and returns the message NEW FILE.

DEBUG

DEBUG is a resident debugger program used to provide a controlled testing environment for binary code files (executable object files) that do not function correctly. DEBUG allows the user to alter a file at an address or in a CPU register, then execute the altered instructions as an immediate check of the validity of the changes.

If a syntax error occurs in a DEBUG command, DEBUG reprints the command line and indicates the error with an up-arrow and the word *error*. For example:

```
dcs:100 cs:110
          ↑ error (not a valid hex digit)
```

All DEBUG errors terminate the DEBUG command, but not DEBUG.

Additional MS-DOS Features and Benefits

- **Written Entirely in 8086 Assembly Language**

  This provides significant speed improvements over operating systems that are largely translated from their 8-bit counterparts.

- **Fast Efficient File Structure**

  The format eliminates the need for "extents," minimizes access to the directory track, and provides for duplicate directory information and verify after write.

- **No Need to Log in Disks**

  As long as no file is currently open, there is no need to log in a new disk by typing Control-C. This greatly improves usability for single disk system users and for people who like to store their data on separate diskettes.

- **No Physical File/Disk Size Limitation**

  Unlike users of operating systems that are limited to 8 megabytes, MS-DOS users would not have to break a 24 megabyte hard disk into three separate drives.

- **No Overhead for Non-128-Byte Physical Sectors**

  One does not have to worry about different physical sector sizes when writing a BIOS.

- **Time/Date Stamps**

  This alleviates, for instance, the need to recompile a file if the time on the relocatable file is more recent than on the source file.

- **Lifeboat Associates**

  The world's largest independent distributor of microcomputer software has chosen to support MS-DOS as its low-end 16-bit operating system. Recognizing the important migration path from the 8-bit level to XENIX OS, Lifeboat will be offering a wide range of software for the MS-DOS environment.

- **100% IBM Compatible**

  IBM is offering software running under MS-DOS. IBM has announced Microsoft BASIC and Microsoft Pascal, along with accounting, financial planning, and word processing software running under MS-DOS.

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